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CHROMOSOME NUMBERS FOR SOME ANGIOSPERMS OF THE SOUTHERN UNITED STATES AND MEXICO

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Chromosome numbers are reported for 34 families including 57 genera and 73 species and varieties collected in the southern United States and Mexico. The chromosomes of one family, Turneraceae, and of 17 genera are given for the first time. The new generic reports include those for: *Brunnichia* (Polygonaceae), *Cnidoscolus* (Euphorbiaceae), *Cliftonia* (Cyrillaceae), *Piriqueta* (Turneraceae), *Rotala* (Lythraceae), *Samolus* (Primulaceae), *Halesia* (Styraceae), *Cynoctonum* (Loganiaceae), *Sabatia* (Gentianaceae), *Bonamia* (Convolvulaceae), *Pycnanthemum* (Labiatae), *Bacopa, Buchnera, Lindernia, Mecardonia, Trigiola* (Scrophulariaceae), and *Sphenoclea* (Campanulaceae). In addition, the first definite chromosome numbers are recorded for *Apios* (Leguminosae) and *Utricularia* (Lentibulariaceae). Among

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the 73 species and varieties listed, 53 are new chromosome reports, 4 conflict with previous results, and 16 are verifications of earlier counts.

The families are listed according to Cave (1956-60), except that the Smilacaceae and the Krameriaceae are separated from the Liliaceae and the Leguminosae, respectively. The genera and species are reported alphabetically within families. For each taxon the following data are given: (a) an asterisk after the name if this is the first reported number or if it is at variance with a previous record; (b) somatic and/or gametic numbers from premeiotic cells and/or PMCs, unless otherwise indicated; (c) figure number if the chromosomes are illustrated; (d) voucher with locality, collector, and citation of herbarium where deposited; (e) number of plants studied when more than one; and (f) name of taxonomist who determined voucher if not by the authors. When pertinent a brief discussion and reference to earlier work is also added.

Most of the chromosome numbers were obtained from PMC meiosis and premeiotic mitosis of immature buds fixed in the field. Occasionally, root tips, pretreated for 2-3 hours in paradichlorobenzene, and pollen mitosis served as the basis for the chromosome reports. For some species plants from more than one locality were sampled and when possible more than one from each population. All material was fixed in modified Carnoy's (4: 3: 1) and stained in either 1% acetic-orcein or 1% iron aceto-carmine. Chromosomes were drawn with the aid of a camera lucida originally at X 2300 and reduced by ca. 2/5 in reproduction.

CYPERACEAE

Eleocharis obtusa (Willd.) Schultes*: **n = 5** (pollen mitosis), fig. 1. Texas. Panola Co., Lake Murvaul, *Hull 7* (SMU).

XYRIDACEAE

Xyris elliottii Chapm.*: (1) **n = 9.** Florida. Citrus Co., 0.4 miles N of Citrus-Hernando Co. line, *Lewis 5653* (VPI). (2) **n = 9**, fig. 2. Florida. Glades Co., 8.6 miles SE of Palmdale, *Lewis 5684* (VPI). Determined by Dr. Robert Kral.

X. torta Sm.: **n = 9**, fig. 3. Virginia. Augusta Co., ca. 2.5 miles SW of Sherando, *Kral 13394* (VPI). Determined by the collector. Verification of Lewis (1961) for a plant allied to *X. torta* but thought to represent a new taxon.

COMMELINACEAE

Commelina erecta L. var. *angustifolia* (Michx.) Fern.*: **n = 30**, fig. 4. Texas. Nacogdoches Co., 1.4 miles NW of Nacogdoches, *Stevens 10* (SMU).

C. diffusa Burm. f.: **2n = 30**, fig. 5. Texas. Nacogdoches Co., Nacogdoches, *Stevens 17* (SMU, TEX). Verification of Simmonds (1954), but not that of Morton (1956) who found $2n = 28$ chromosomes for west African material.

C. virginica L.*: **n = 30**. Texas. Nacogdoches Co., Angelina River and Hwy. 21, Stevens 16 (SMU, TEX).

Tradescantia navicularis Ortgies*: **n = 24** (first pollen mitosis), fig. 6. MEXICO. Nuevo Leon. 15.2 miles E of Hwys. 57 and 60 junction, *Lewis 5756* (SMU). Determined by Dr. Harold E. Moore, Jr. Darlington (1929) reported $n = 16$ ($4x$) for this taxon, which suggests that our material is part of a hexaploid race or that Darlington's plant was a second species. This is the first record of *T. navicularis* from Nuevo Leon.

T. ohiensis Raf.: **n = 12** (first pollen mitosis). Arkansas. St. Francis Co., 1.5 miles N of Goodwin, *Lewis 5611* (SMU). Verification of the $4x$ race recorded by Anderson and Sax (1936) under *T. canaliculata* Raf.

T. reverchoni Bush: **n = 12** (first pollen mitosis). Texas. Nacogdoches Co., 2 miles NE of Nacogdoches, *Stevens 9* (SMU, TEX). Verification of Brown *et al.* (1951).

SMILACACEAE

Smilax glauca Walt.*: **2n = 32**. Texas. Nacogdoches Co., Angelina River and Hwy. 21, *Ross 70* (SMU, TEX). Jensen (1937) recorded $n = 14$ chromosomes for *S. glauca* which on the basis of this count, and for others of closely related species, seems to be in error.

S. bona-nox L.*: **2n = 32**, fig 7. Texas. Panola Co., 2.3 miles NE of Pinehill, *Lewis 5718* (SMU, TEX); 2 plants studied.

AMARYLLIDACEAE

Ipheion uniflorum (Graham) Raf. **2n = 12** (root tips). Bulbs received from Dr. L. H. Shinners, originally from the Oakhurst Gardens, Arcadia, California, *Lewis 5434* (SMU). Verification of Saez (1949) under *Brodiaea*.

LORANTHACEAE

Phoradendron bolleanum (Seem.) Eichl.*: **2n = 28**. Texas. Brewster Co., Big Bend National Park, *Lewis & Oliver 5452* (SMU). Without

pretreatment the metaphase chromosomes vary in length from 13.4 μ to 33.6 μ for the longest pair. Bowden and Speese (1957) noted the exceptional length of chromosomes for *P. flavescens* [= *P. serotinum* (Raf.) M. C. Johnst.] even after pretreatment for 24 hours.

POLYGONACEAE

Brunnichia cirrhosa Gaertn.*: **n = 24,** fig. 8. Texas. Nacogdoches Co., 1 mile E of Martinsville, *Oliver 62* (SMU).

PHYTOLACCACEAE

Phytolacca americana L.: **n = 18.** Texas. Nacogdoches Co., Stephen F. Austin Experimental Forest, *Ross 82* (ASTC). Verification of $2n = 36$ by Suzuka (1950).

PORTULACACEAE

Claytonia virginica L.: (1) **n = 12,** fig. 9. Kentucky. Warren Co., 0.7 miles NW of Petros, *Lewis 5606* (SMU); 2 plants studied. (2) **n = 36,** fig. 10. Kentucky. Green Co., 1.4 miles NW of Greensburg, *Lewis 5603* (SMU); 2 plants studied. PMC meioses of both plants from the first population were regular, but those from the second population were highly abnormal in behavior. The following configurations from two plants were noted at metaphase I: 35 II + 2 I, 34 II + 4 I, 33 II + 6 I, 32 II + 8 I, 34 II + 1 III + 1 I, 33 II + 1 III + 3 I, 30 II + 1 III + 7 I, and 32 II + 1 IV + 4 I. These variations in chromosome number and in meiotic behavior are not surprising in view of the results of Rothwell (1959) and of Lewis (1962).

RANUNCULACEAE

Aquilegia canadensis L. var. *australis* (Small) Munz*: **2n = 14,** fig. 11. Florida. Jackson Co., 3 miles N of Marianna, *Mitchell 27* (FSU); 2 plants studied. This variety is known only from the Marianna Red Hills region of Florida.

Isopyrum biternatum (Raf.) T. & G.*: **2n = 14,** fig. 12. Florida. Jackson Co., 3 miles N of Marianna, *Mitchell 1* (FSU); 2 plants studied.

MENISPERMACEAE

Cocculus carolinus (L.) DC.: **n = 39.** Texas. Nacogdoches Co., Nacogdoches, *Ross 42* (SMU). Verification of Bowden's (1945) $2n = 78$.

CRUCIFERAE

Cardamine bulbosa (Schreb.) B.S.P.*: **2n = 64.** Texas. Shelby Co., 2 miles SW of Timpson, *Lewis 4998* (SMU).

Lesquerella purpurea (Gray) Wats.*: **n = 9, 2n = 18,** fig. 13. Texas. Brewster Co., Big Bend National Park, *Ross 50* (SMU, TEX).

SAXIFRAGACEAE

Ribes echinellum (Cov.) Rehd.* (*Grossularia echinella* Cov.): **2n = 16,** fig. 14. Florida. Leon Co. Tallahassee, cultivated, *Stripling 779* (FSU). The Florida gooseberry is endemic to the Lake Miccosukee region in Jefferson Co.; this plant was studied after transplanting to Tallahassee.

LEGUMINOSAE

Apios americana Medic.*: **n = 11**, fig. 15. Texas. Nacogdoches Co., Nacogdoches, *Redus 15* (SMU); 2 plants studied. This number does not agree with that found by Atchison (1949), and reported under the synonym *A. tuberosa* Moench., and undoubtedly her number of $2n$ = ca. 40 refers to another taxon. The basic number for *Apios* is $x = 11$.

Centrosema virginianum (L.) Benth.*: (1) **n = 9**, fig. 16. Texas. Nacogdoches Co., Nacogdoches, *Redus 1* (SMU, TEX); 2 plants studied. (2) **n = 9**. Texas. Nacogdoches Co., Angelina River and Hwy. 21, *Redus 13* (TEX): 2 plants studied. These counts add a new basic number of $x = 9$ to the genus, a number rare in the Leguminosae.

Desmodium canescens (L.) DC.: **n = 11**, fig. 17. Texas. Nacogdoches Co., Nacogdoches, *Redus 9* (SMU, TEX). Verification of Young (1940).

Erythrina herbacea L.: **2n = 42**. Texas. Nacogdoches Co., Nacogdoches, *Lewis & Oliver 5234* (ASTC). Verification of Atchison (1947).

Galactia macreei Curtis*: **n = 10**, fig. 18. Texas. Nacogdoches Co., Nacogdoches, *Redus 6* (SMU).

KRAMERIACEAE

Krameria lanceolata Torr.: **n = 6**. Texas. San Patricio Co., 5 miles SE of Mathis, *Lewis & Jones 5589* (SMU). Verification of Turner (1958). At anaphase I, the longest chromosome measured 24.6 μ, the shortest 10.0 μ and the six averaged 17.3 μ. As noted by Turner, these chromosomes are among the longest known in the dicotyledons although those of *Phoradendron bolleanum* given above are even greater in length.

EUPHORBIACEAE

Cnidoscolus texanus (Muell. Arg.) Small*: **n = 18**, fig. 19. Texas. Nacogdoches Co., Nacogdoches, *Ross 66* (SMU).

Croton capitatus Michx. var. *lindheimeri* (Engelm. & Gray) Muell. Arg.*: **2n = 20** (root tips), fig. 20. Texas. Nacogdoches Co., Nacogdoches, *Lewis 4994* (ASTC).

CYRILLACEAE

Cliftonia monosepala (Lam.) Sarg.*: (1) **n = 10, 2n = 20**, fig. 21. Florida. Leon Co., 15 miles SW of Tallahassee, *Stripling 1007* (FSU); 2 plants studied. (2) **2n = 20**. Florida. Jefferson Co., 1.5 miles SW of Wacissa, *Stripling 1004* (FSU); 2 plants studied. (3) **n = 10**. Florida. Leon Co., Branch Bay, near Silver Lake, *Godfrey 60543* (FSU). (4) **2n = 20**. Florida. Wakulla Co., Spring Hill Road, SW of Tallahassee, *Godfrey 60544* (FSU). There are no previous counts for this family other than a report of $n = 20$ in most cells of *Cyrilla racemiflora* L. (Thomas, 1960). Thomas noted fast deterioration of fixed buds and this was found to be true for *Cliftonia*. Our best results were obtained no later than 2-4 days after fixation.

GUTTIFERAE

Hypericum sp. *: **n = 9, 2n = 18**, fig. 22. Florida. Washington Co., *Adams & Tyson 833* (FSU); 2 plants studied. A new specific name will be given to this collection by Dr. P. Adams, DePauw University.

H. microsepalum (T. & G.) Gray* [*Crookea microsepalum* (T. & G.) Small]: (1) **n = 9, 2n = 18**, fig. 23. Florida. Wakulla Co., 4 miles N of Sopchoppy, *Stripling 772* (FSU). (2) **2n = 18**. Florida. Leon Co., 6 miles S of Tallahassee, *Stripling 786* (FSU).

VIOLACEAE

Viola walteri House: **2n = 20** (root tips), fig. 24. Texas. Nacogdoches Co., Nacogdoches, *Lacey 3* (SMU, ASTC). Verification of Gershoy (1934).

TURNERACEAE

Piriqueta glabrescens Small*: **n = 7**, fig. 25 as 6 II + 2 I. Florida. Collier Co., 7.1 miles E of Napes, *Osborne 62* (FSU, SMU); 3 plants studied, mostly with 7 II. Determined by Dr. C. M. Rogers.

P. tomentosa HBK.*: **n = 7**, fig. 26. Florida. Monroe Co., Big Pine Key, *Osborne 66* (FSU); 3 plants studied. Determined by Dr. C. M. Rogers.

LYTHRACEAE

Rotala ramosior (L.) Koehne*: **n = 16**, fig. 27. Texas. Angelina Co., Angelina River and Hwy. 59, *Lewis & Oliver 5273* (SMU).

PRIMULACEAE

Samolus parviflorus Raf.*: **n = 13, 2n = 26**, fig. 28. Louisiana. St. Mary Par., 8.7 miles NW of Boyeau Vista, *Oliver 261* (SMU); 2 plants studied.

STYRACEAE

Halesia diptera Ellis. var *diptera**: **2n = 24**, fig. 29. Florida. Leon Co., Tallahassee, cultivated, *Stripling 732* (FSU).

H. diptera Ellis. var. *magniflora* Godfrey*: **2n = 24**, fig. 30. Florida. Leon Co., Tallahassee, cultivated, *Stripling 730* (FSU).

H. tetraptera Ellis.* [*H. parviflora* Michx., not *H. carolina (tetraptera)* as listed in Darlington & Wylie (1956), cf. Godfrey (1958)]: **2n = 24**, fig. 31. Florida. Leon Co., Tallahassee, cultivated, *Stripling 716* (FSU).

OLEACEAE

Menodora scabra Gray*: **n = 11**, fig. 32. Texas. Brewster Co., Big Bend National Park, *Ross 52* (SMU, TEX). This number does not agree with that of Taylor (1945) who found $2n = 44$ chromosomes. Perhaps $2x$ and $4x$ races exist for the species.

LOGANIACEAE

Cynoctonum mitreola (L.) Britt.*: **n = 10, 2n = 20**. Texas. Liberty

Co., 4 miles E of Cleveland, *Ross 73* (SMU, TEX); 2 plants studied. Determined by Dr. L. H. Shinners.

GENTIANACEAE

Sabatia campestris Nutt.*: (1) **n = 13**, fig. 33. Texas. Brazos Co., College Station, *Lewis 5494* (SMU). (2) **2n = 26.** Texas. Nacogdoches Co., Nacogdoches, *Lewis & Oliver 5233* (SMU).

CONVOLVULACEAE

Bonamia humistrata (Walt.) Gray*: **n = 14**, fig. 34. Texas. Panola Co., Sabine River and Hwy. 59, *Lewis & Oliver 5318* (SMU). Some PMCs were observed with 13 II + 2 I and still others with a trivalent at metaphase I.

B. pickeringii (Torr.) Gray*: (1) **n =14**, fig. 35. Texas. Rusk Co., 3.1 miles N of Cushing, *Lewis & Oliver 5279* (SMU). At least 50% of the PMCs had 13 II + 2I. (2) **2n = 28.** Texas. Nacogdoches Co., 0.5 miles W of Nacogdoches, *Lewis & McDaniel 5509* (SMU).

Jacquemontia abutiloides Benth.*: **2n = 18.** MEXICO. Baja California Sur. 3 km. S of Miraflores, *Lewis 5339* (SMU); 2 plants studied. Determined by Dr. L. H. Shinners.

LABIATAE

Pycnanthemum albescens T. & G.*: **n = 33-36.** Texas. Liberty Co., 2 miles E of Cleveland, *Ross 61* (SMU).

Salvia reflexa Hornem.*: **n = 10**, fig. 36. MEXICO. Nuevo Leon. 9.9 miles E of Hwys. 57 and 60 junction, *Lewis 5750* (SMU, TEX). Determined by Dr. L. H. Shinners.

Scutellaria cf. *integrifolia* L.*: **2n = 32**, fig. 37. Florida. Sarasota Co., 12 miles E of Sarasota, *Stripling 754* (FSU); 2 plants studied.

Stachys tenuifolia Willd.*: **n = 16**, fig. 38. Texas. Nacogdoches Co., Stephen F. Austin Experimental Forest, *Ross 56* (SMU, TEX).

SOLANACEAE

Nicotiana glauca Graham: **2n = 24.** MEXICO. Baja California Sur. 1.4 km. W of San José del Capo, *Lewis 5354* (SMU). Verification of Goodspeed (1923).

SCROPHULARIACEAE

Bacopa monnieri (L.) Pennell*: **2n = 64**, fig. 39. Texas. Harris Co., 2 miles E of Humble, *Lewis 5497* (SMU).

Buchnera americana L.*: **2n = ca. 42.** Texas. Jasper Co., 50 yards S of Hwys. 96 and 1004 junction, *Lewis 5623* (SMU).

Gratiola ramosa Walt.*: (1) **n = 7, 2n = 14**, fig. 40. Florida. Levy Co., 1 mile SW of Otter Creek, *Stripling 734* (FSU); 2 plants studied. **(2) n = 7, 2n = 14.** Florida. Wakulla Co., 3 miles E of Carabelle, *Stripling 781* (FSU); 2 plants studied.

G. aurea Muhl.*: **2n = 28**, fig. 41. Georgia. Cook Co., Little River bridge and Hwy. 76, *Adams 588* (FSU); 3 plants studied.

G. brevifolia Raf.*: (1) **n = 14, 2n = 28**, fig. 42. Florida. Leon Co., 7 miles SW of Tallahassee, *Stripling 794* (FSU); 3 plants studied. (2) **2n = 28**. Florida. Gadsden Co., 3 miles W of Ochlockonee River bridge and Hwy. 90, *Stripling 777* (FSU). (3) **2n = 28**. Florida. Jefferson Co., 4.5 miles E of Monticello, *Stripling 795* (FSU); 2 plants studied. (4) **n = 14, 2n = 28**. Texas. Liberty Co., 4 miles E of Cleveland, *Ross 77* (SMU, FSU); 2 plants studied.

G. virginiana L.*: **n = 8, 2n = 16**, fig. 43. Florida. Leon Co., 6 miles SE of Tallahassee, *Stripling 705* (FSU); 3 plants studied.

These counts represent a part of a detailed study of the Gratiolas (s. l.) now in progress. A new basic number of $x = 7$ is reported for the genus and includes *G. ramosa*, *G. aurea*, and *G. brevifolia* in the section *Gratiolaria* while *G. virginiana* in the section *Nibora* belongs to a second line with $x = 8$ chromosomes.

Lindernia dubia (L.) Pennell*: **n = 16, 2n = 32**, fig. 44. Texas. San Augustine Co., 8.2 miles SE of San Augustine, *Lewis et al. 5500* (FSU).

Mecardonia acuminata (Walt.) Small*: **2n = 42 ± 2**. Texas. Cherokee Co., Angelina River and Hwy. 21, *Lewis et al. 5505* (SMU).

Scoparia dulcis L.*: **n = 10**, fig. 45. Texas. Liberty Co., 2 miles E of Cleveland, *Ross 62* (SMU, TEX). Raghaven & Srinivasan (1940) recorded a tetraploid number of $2n = 40$.

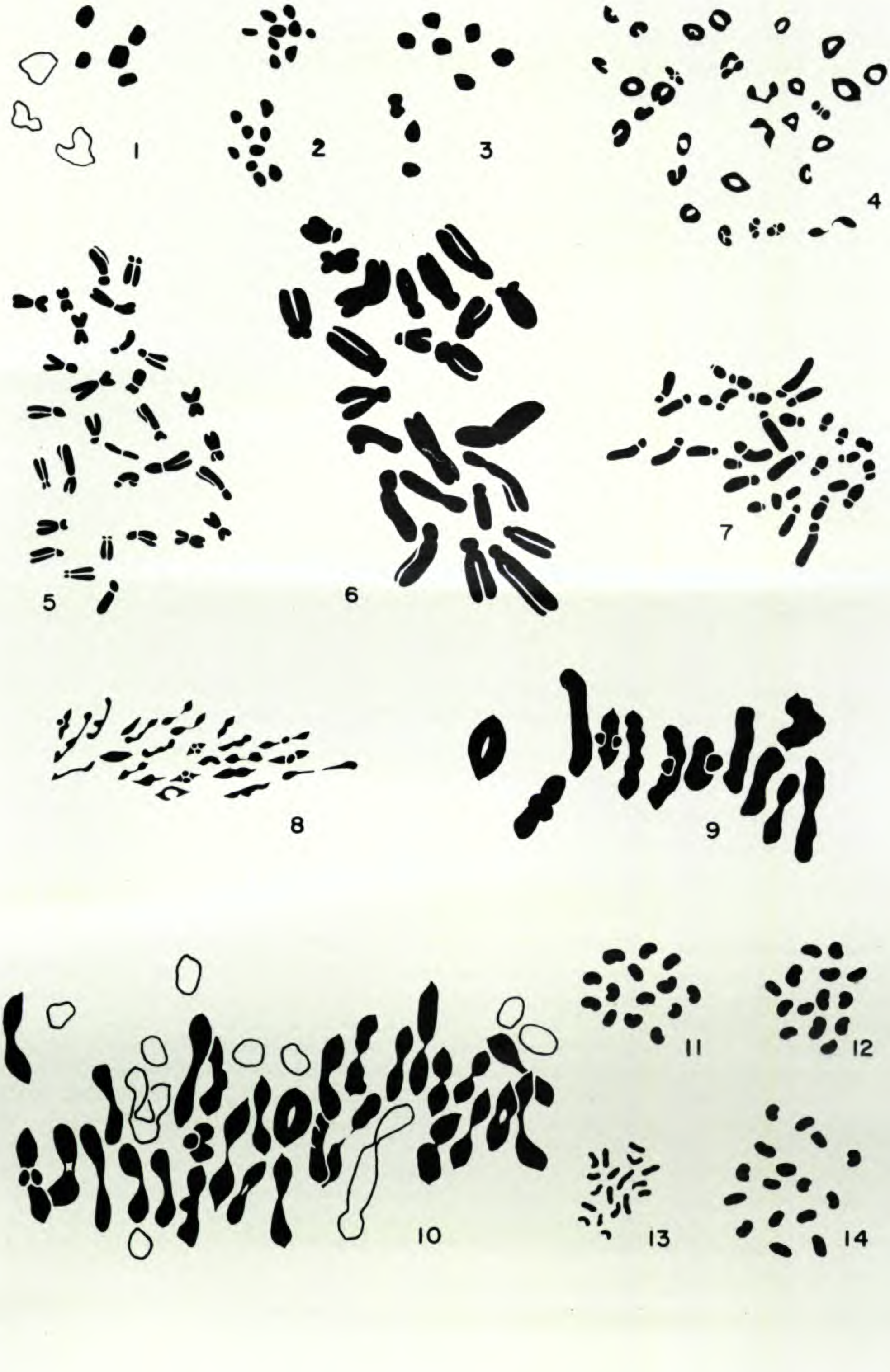
Tragiola pilosa (Michx.) Small & Pennell*: (1) **2n = 22**, fig. 46. Florida. Taylor Co., 9 miles W of Perry, *Stripling 883* (FSU); 2 plants studied. (2) **2n = 22**, Florida. Levy Co., 11 miles NW of Dunnellon, *Stripling 876* (FSU).

Veronica persica Poiret: **2n = 28**, fig. 47. Florida. Leon Co., Tallahassee, *Stripling 788* (FSU); 3 plants studied. Beatus (1936) recorded this number for *V. persica* in Europe, but there is some doubt as to the exact species he examined. Although not previously examined cytologically from the United States, our data verify counts from Canadian (Mulligan, 1959) and Icelandic (Löve & Löve, 1956) populations.

LENTIBULARIACEAE

Utricularia inflata Walt.*: (1) **n = 9, 2n = 18**, fig. 48. Florida. Leon Co., 1 mile E of Ochlockonee River and Hwy. 90, *Godfrey 59374*

FIG. 1-14. Chromosomes of angiosperms, X 1350. Fig. 1. *Eleocharis obtusa*, *Hull 7*, $n = 5$, with 3 degenerating nuclei; fig. 2. *Xyris elliottii*, *Lewis 5684*, $n = 9$; fig. 3. *X. torta*, *Kral 13394*, $n = 9$; fig. 4. *Commelina erecta* var. *angustifolia*, *Stevens 10*, $n = 30$; fig. 5. *C. diffusa*, *Stevens 17*, $2n = 30$; fig. 6. *Tradescantia navicularis*, *Lewis 5756*, $n = 24$; fig. 7. *Smilax bona-nox*, *Lewis 5718*, $2n = 32$; fig. 8. *Brunnichia cirrhosa*, *Oliver 62*, $n = 24$; fig. 9. *Claytonia virginica*, *Lewis 5606*, $n = 12$; fig. 10. *C. virginica*, *Lewis 5603*, $n = 36$ (29 II + 8 I + 2 III); fig. 11. *Aquilegia canadensis* var. *australis*, *Mitchell 27*, $2n = 14$; fig. 12. *Isopyrum biternatum*, *Mitchell 1*, $2n = 14$; fig. 13. *Lesquerella purpurea*, *Ross 50*, $2n = 18$; fig. 14. *Ribes echinellum*, *Stripling 779*, $2n = 16$.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(FSU); 3 plants studied. (2) **2n = 36**, fig. 49. Florida. Leon Co., 4 miles W of Tallahassee, *Reinert 2* (FSU); 2 plants studied. The previous numbers reported for *Utricularia* (cf. Darlington & Wylie, 1956) are all approximations, viz., $2n = 36$-40 or ca. 40 chromosomes. Our data establish $x = 9$ as a basic number for the genus and also record *U. inflata* as having $2x$ and $4x$ races.

ACANTHACEAE

Justicia lanceolata (Chapm.) Small*: (1) **n = 14**, fig. 50. Texas. Angelina Co., Angelina-Nacogdoches Co. line and Hwy. 301, *Lewis & Oliver 5320* (SMU). (2) **n = 14**. Texas. Angelina Co., Angelina River and Hwy. 7, *Lewis & Oliver 5325* (SMU). (3) **n = 14 + 1, 2n = 29**, fig. 51. Texas. Panola Co., 0.7 miles NE of Sabine River and Hwy. 59, *Lewis & Oliver 5309* (SMU). The single plant from the third locality consistently had 14 II + 1 I at meiosis I and an extra chromosome in the mitotic plates. The chromosome was small but not heteropycnotic.

CAMPANULACEAE

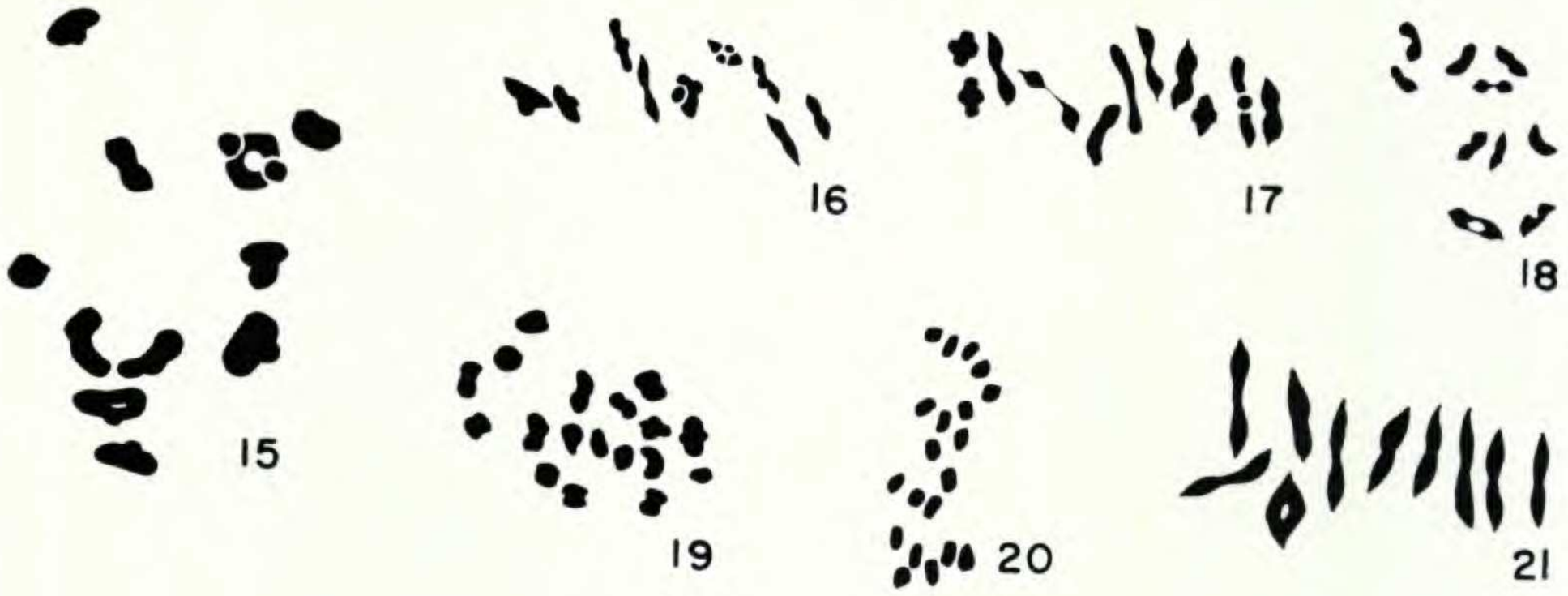
Sphenoclea zeylanica Gaertn.*: **n = 12**. Texas. Nacogdoches Co., Angelina River and Hwy. 59, *Oliver 357* (SMU, TEX). Determined by Dr. L. H. Shinners.

COMPOSITAE

Cirsium horridulum Michx.*: (1) **2n = 34**, fig. 52. Florida. Franklin Co., near Alligator Point, *Godfrey 59335* (FSU); 2 plants studied. (2) **2n = 34**. Florida. Leon Co., 21 miles SW of Tallahassee, *Stripling 697* (FSU); 2 plants studied.

Elephantopus carolinianus Raeusch.: **n = 11**. Texas. Nacogdoches Co., Angelina River and Hwy. 21, *Ross 72* (SMU, TEX). Verification of Baldwin & Speese (1955) as $2n = 22$.

FIG. 15-38. Chromosomes of angiosperms. × 1350. Fig. 15. *Apios americana, Redus 15*, $n = 11$; fig. 16. *Centrosema virginianum, Redus 1*, $n = 9$; fig. 17. *Desmodium canescens, Redus 9*, $n = 11$; fig. 18. *Galactia macreei, Redus 6*, $n = 10$; fig. 19. *Cnidoscolus texanus, Ross 66*, $n = 18$; fig. 20. *Croton capitatus, Lewis 4994*, $2n = 20$; fig. 21. *Cliftonia monosepala, Stripling 1007*, $n = 10$; fig. 22. *Hypericum* sp., *Adams & Tyson 833*, $n = 9$; fig. 23. *H. microsepalum, Stripling 772*, $n = 9$; fig. 24. *Viola walteri, Lacey 3*, $2n = 20$; fig. 25. *Piriqueta glabrescens, Osborne 62*, $n = 7$ (6 II + 2 I); fig. 26. *P. tomentosa, Osborne 66*, $n = 7$; fig. 27. *Rotala ramosior, Lewis & Oliver 5273*, $n = 16$; fig. 28. *Samolus parviflorus, Oliver 261*, $n = 13$; fig. 29. *Halesia diptera* var. *diptera, Stripling 732*, $2n = 24$; fig. 30. *H. diptera* var. *magniflora, Stripling 730*, $2n = 24$; fig. 31. *H. tetraptera, Stripling 716*, $2n = 24$; fig. 32. *Menodora scabra, Ross 52*, $n = 11$ (1 side anaphase I); fig. 33. *Sabatia campestris, Lewis 5494*, $n = 13$; fig. 34. *Bonamia humistrata, Lewis & Oliver 5318*, $n = 14$; fig. 35. *B. pickeringii, Lewis & Oliver 5279*, $n = 14$; fig. 36. *Salvia reflexa, Lewis 5750*, $n = 10$; fig. 37. *Scutellaria* cf. *integrifolia, Stripling 754*, $2n = 32$; fig. 38. *Stachys tenuifolia, Ross 56*, $n = 16$.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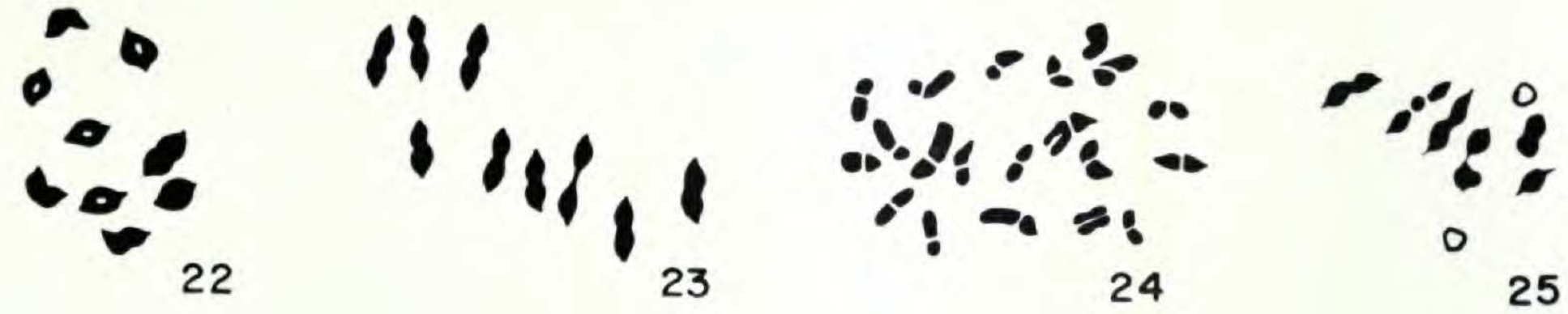
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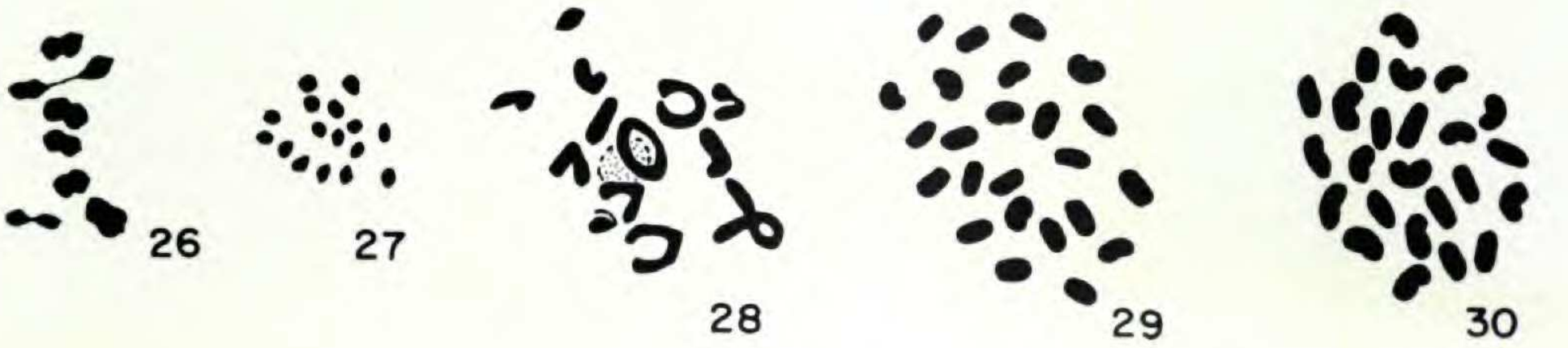
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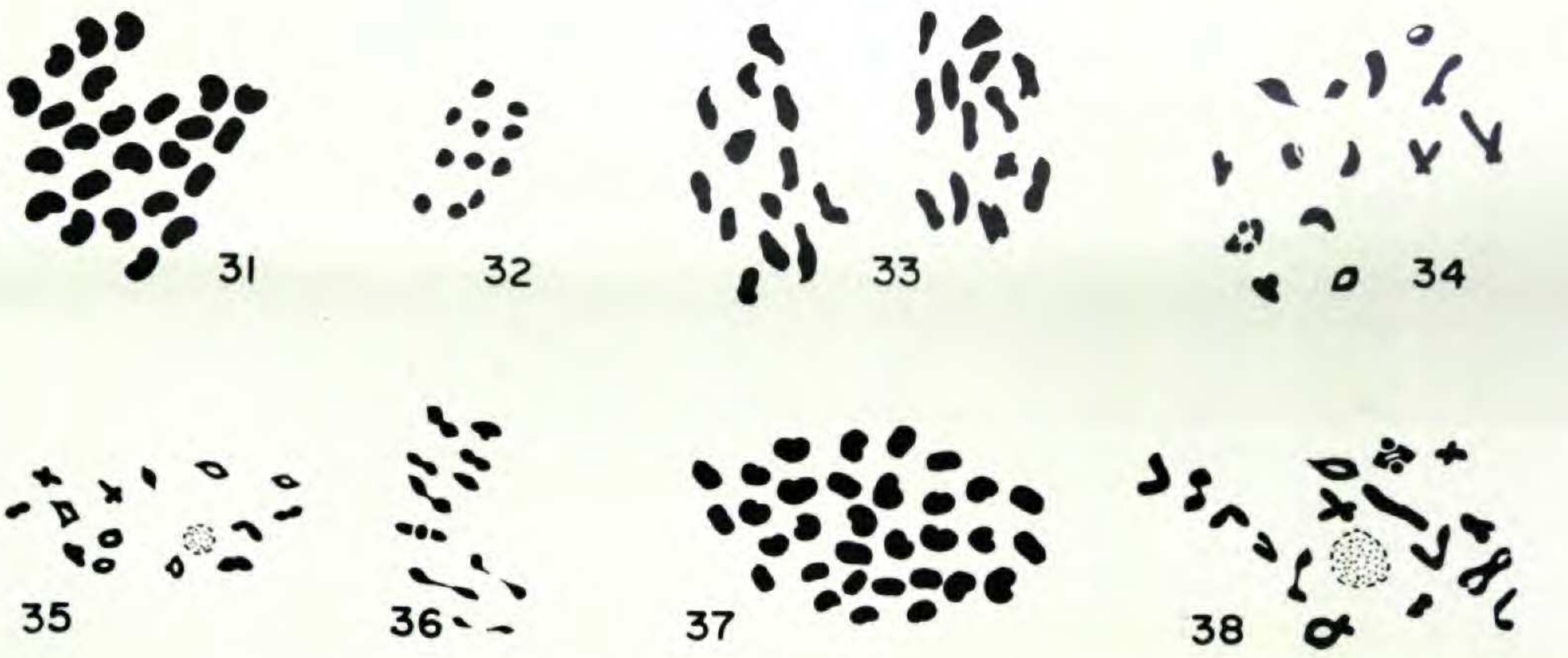
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Liatris acidota Engelm. & Gray: **n = 10.** Texas. Liberty Co., 4 miles E of Cleveland, *Ross 76* (SMU, TEX). Verification of Gaiser (1949).

Perityle sp.*: **n = 19.** MEXICO. Baja California Sur. 14 km. N of La Paz, *Lewis 5351* (SMU).

P. palmeri Wats.*: **n = 19,** fig. 53. MEXICO. Sonora. 2.8 miles N of Guaymas, *Lewis 5334* (SMU).

Silphium asperrimum Hook.*: (1) **n = 8, 2n = 16,** fig. 54. Texas. Smith Co., 1 mile N of Bullard, *Stripling 510* (FSU); 2 plants studied. (2) **2n = 16.** Texas. Nacogdoches Co., 3 miles S of Nacogdoches, *Stripling 586* (FSU).

S. compositum Michx.*: **n = 7, 2n = 14,** fig. 55. Florida. Lafayette Co., between Fletcher and Cross City along Hwy. 351, *Stripling 798* (FSU); 3 plants studied. — STEPHEN F. AUSTIN STATE COLLEGE, NACOGDOCHES, TEXAS, AND FLORIDA STATE UNIVERSITY, TALLAHASSEE.

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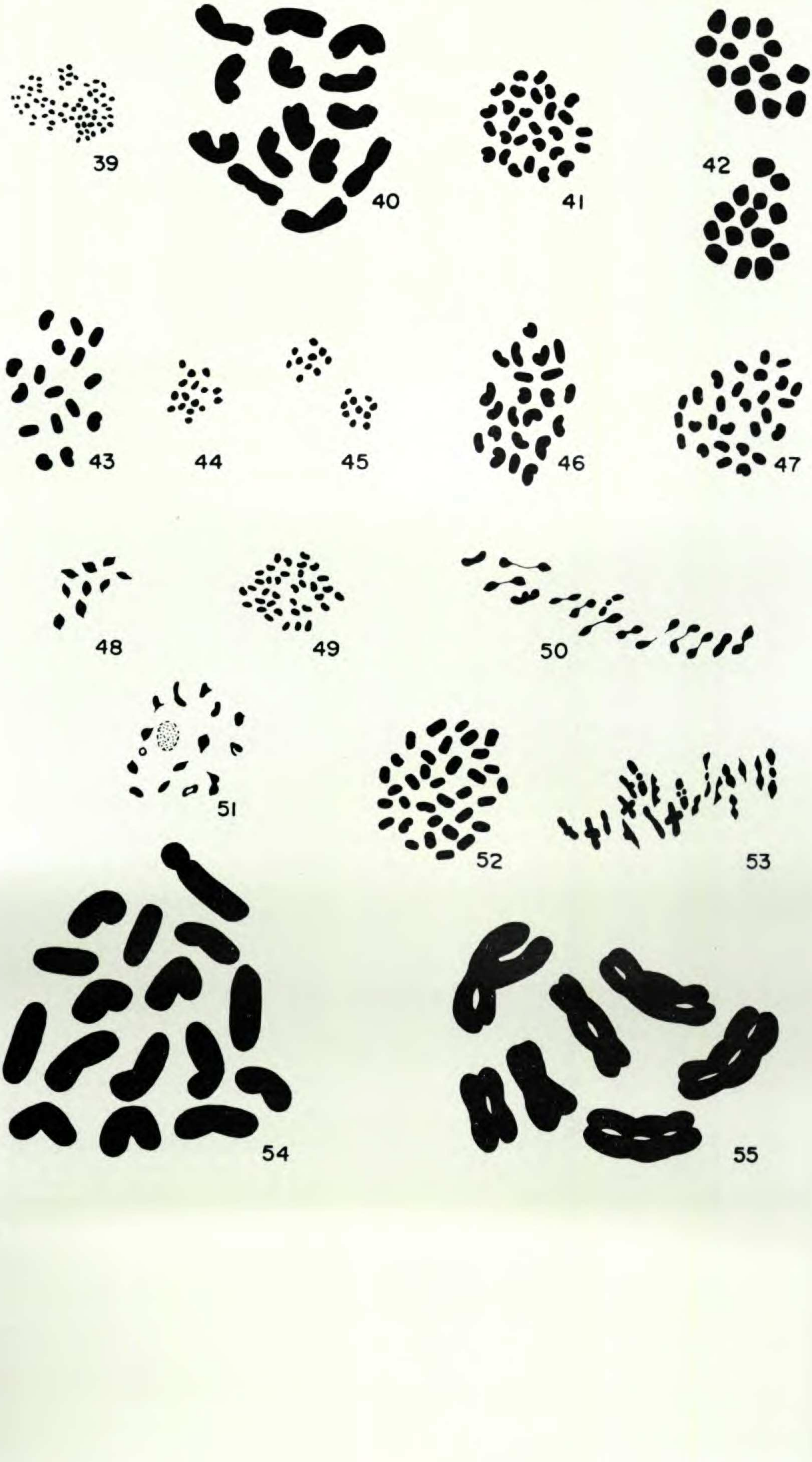
FIGS. 39-55. Chromosomes of angiosperms, X 1350. Fig. 39. *Bacopa monnieri, Lewis 5497,* $2n = 64$; fig. 40. *Gratiola ramosa, Stripling 734,* $2n = 14$; fig. 41. *G. aurea, Adams 588,* $2n = 28$; fig. 42. *G. brevifolia, Stripling 794,* $n = 14$; fig. 43. *G. virginiana, Stripling 705,* $2n = 16$; fig. 44. *Lindernia dubia, Lewis et al.* 5500, $n = 16$; fig. 45. *Scoparia dulcis, Ross 62,* $n = 10$; fig. 46. *Tragiola pilosa, Stripling 883,* $2n = 22$; fig. 47. *Veronica persica, Stripling 788,* $2n = 28$; fig. 48. *Utricularia inflata, Godfrey 59374,* $n = 9$; fig. 49. *U. inflata, Reinert 2,* $2n = 36$; fig. 50, *Justicia lanceolata, Lewis & Oliver 5320,* $n = 14$; fig. 51. *J. lanceolata, Lewis & Oliver 5311,* $n = 14 + 1$ (14 II + 1 I); fig. 52. *Cirsium horridulum, Godfrey 59335,* $2n = 34$; fig. 53. *Perityle* sp., *Lewis 5351,* $n = 19$; fig. 54. *Silphium asperrimum, Stripling 510,* $2n = 16$; fig. 55. *S. compositum, Stripling 798,* $n = 7$.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GLANDULARITY IN RUBUS ALLEGHENIENSIS PORTER[1]

A. R. HODGDON AND FREDERIC STEELE

For the past 4 years we have been studying the blackberries of New Hampshire and nearby parts of Maine and Vermont. This was started as a floristic study to determine what taxa occur in New Hampshire and where in the State each is found.

Fernald (1) quoted in part here, has the following to say about the classification of *Rubus* Subgenus *Eubatus* which embraces the Blackberries, "Taxonomically a most difficult group. Our few original wide-ranging, essentially unvarying and ancient species have greatly commingled producing sometimes localized but rapidly spreading offspring . . ." We have assumed as Fernald apparently did from what he stated farther on in this long footnote, that certain of the multitude of species that have been described are of a different order taxonomically from the others.

One of our primary objectives has been to determine which of our species in New Hampshire may be characterized as well-marked. Unquestionably one of the most clearly defined is the one in question here, *Rubus allegheniensis.* It has an extensive range and possesses some taxonomic characters that are recognized readily in the majority of specimens though considerable diversity is displayed in some

[1]Published with approval of the Director of the New Hampshire Agricultural Experiment Station as Scientific Contribution No. 290.